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Has NASA Found A Parallel Universe 'Where Time Flows Backwards'? The Truth Behind The Headlines

Jamie Carter Senior Contributor
Science
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No, NASA has not found a "parallel Universe". GETTY

Note: this article has been updated to include details of the research paper that discusses the "CPT symmetric universe" where time would run backwards from the Big Bang.

The internet has done it again. Today it abounds with stories from tabloids like the *New York Post*, *Express* and the *Daily Star*—mostly quoting each other—that major on claims that NASA scientists have evidence that could prove the existence of parallel universes.

It's all *way* overblown and misrepresents what the research in question is about. Scientists actually found evidence (signals) of fundamental particles that may defy our current understanding of physics. It might even just be an issue with how particles interact with ice.

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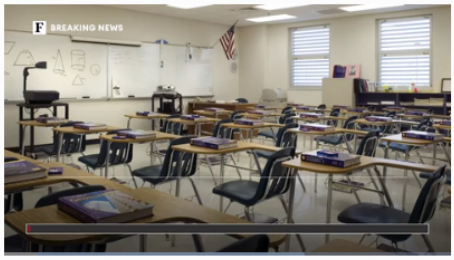

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To be clear, there is *zero* evidence of what the *Daily Star* says is "a parallel universe, right next to ours, where all the rules of physics seem to be operating in reverse."

Here's what Ibrahim Safa of UW–Madison, who was a lead author on a research paper about the experiment in question in Antarctica, thinks about the current spate of "news" stories that associate his research with evidence for a parallel universe:

> **Ibrahim Safa**
> @IbrahimSafa1
>
> NASA has discovered that y'all should not be getting your news from the new york post.
>
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>
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The many, many articles now online appear to be rooted in a six-week old story published by the *New Scientist* in which the admittedly alarming headline—*We may have spotted a parallel universe going backwards in time*—is backed-up by a well-written and thought-provoking article about some puzzling results from studies conducted in Antarctica of cosmic rays (high energy charged particles) arriving from outside Earth's atmosphere. Along with some far-out "what if" musings about the hard-to-explain origins of these particles. Cue the parallel universe chat.

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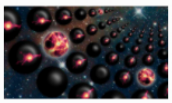
By Ethan Siegel



It's all related to three scientific papers:

- The original research paper from the ANtarctic Impulsive Transient Antenna (ANITA)—a balloon-based experiment—that found "upward-pointing cosmic ray-like-events."
- A research paper published in response that posits that ANITA results could provide evidence for a "CPT symmetric universe," where time would run backwards from the Big Bang and where antimatter would dominate. This is where the "parallel universe" claims come from since the paper reads: "In this scenario the universe before the Big Bang and the universe after the

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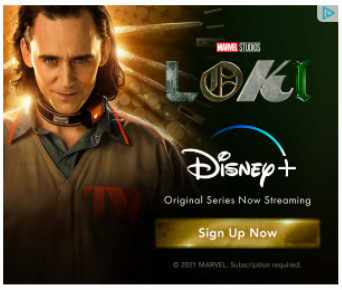

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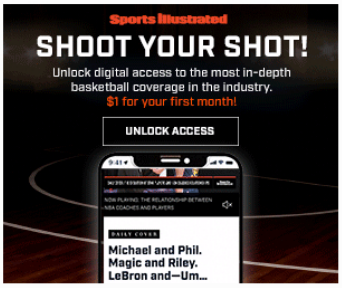
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before the Big Bang and the universe after the Big Bang is reinterpreted as a universe/anti-universe pair that is created from nothing."

- A research paper published in *The Astrophysical Journal* from the IceCube Neutrino Observatory that suggests that we need to consider alternative explanations to explain the ANITA data.

However, the only real conclusion is that the Standard Model concerning neutrinos—fundamental particles—doesn't explain the detection of a rare kind of event by ANITA.

"ANITA's events are definitely interesting, but we're a long ways away from even claiming there's any new physics, let alone an entire universe," said Safa.

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This Is Why Neutrinos Are The Standard Model's Greatest Puzzle

By Ethan Siegel

What is the ANITA?

It's a stratospheric balloon-based experiment in Antarctica that has a radio antennae pointed back at Earth to detect radio waves emitted by very (and very rare) high-energy neutrinos if they strike an atom in the ice. A radio telescope, ANITA is the first NASA observatory for neutrinos of any kind. Hence the NASA connection.

What did the ANITA find?

In 2016, ANITA detected some signals best described as "anomalous"; evidence of a high-energy particle—extremely high-energy neutrinos—coming up from the Earth's surface, but no source. That "seemed impossible," according to the *New Scientist* article, which went on to state that:

"Explaining this signal requires the existence of a topsy-turvy universe created in the same big bang as our own and existing in parallel with it. In this mirror world, positive is negative, left is right and time runs backwards."

That's the CPT symmetric universe.

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By Ethan Siegel

The press release about the research paper also mentions that "other explanations for the anomalous signals—possibly involving exotic physics—need to be considered."

Scientists at the IceCube Neutrino Observatory then tried to search for the source of those signals of intense neutrinos.

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The IceCube Laboratory at the Amundsen-Scott South Pole Station, in Antarctica, hosts the computers ... [+] FELIPE PEDREROS, ICECUBE/NSF

What is the IceCube Neutrino Observatory?

Situated near the South Pole, it's made-up of 5,160 optical detectors buried in the ice that are there to detect neutrinos passing through, and reacting with, hydrogen or oxygen atoms in the ice.

"This process makes IceCube a remarkable tool to follow up the ANITA observations, because for each anomalous event that ANITA detects, IceCube should have detected many, many more—which, in these cases, we didn't," said Anastasia Barbano of the University of Geneva in Switzerland. "That means that we can rule out the idea that these events came from some intense point source, because the odds of ANITA seeing an event and IceCube not seeing anything are so slim."

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By **Jamie Carter**

What did the academic paper conclude?

The results from the check on ANITA detections using IceCube published in the paper concludes with phrases like "inconsistent with a cosmogenic interpretation" and "new physics," and is summarized thus:

"An astrophysical explanation of these anomalous events under standard model assumptions is severely constrained regardless of source spectrum."

Correct translation: we don't yet know where these signals came from.

Incorrect translation: these high-energy neutrinos came from a parallel universe.

Here's what Alex Pizzuto of the University of Wisconsin–Madison, one of the leads on this paper, said in the wake of the "parallel universe" story going viral:

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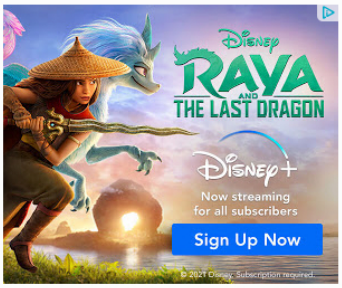

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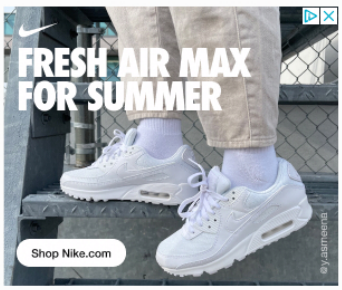

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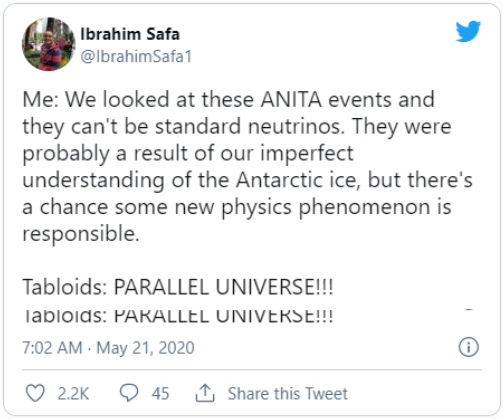
Safa then went on to tweet:


Ibrahim Safa
@IbrahimSafa1
Me: We looked at these ANITA events and they can't be standard neutrinos. They were probably a result of our imperfect understanding of the Antarctic ice, but there's a chance some new physics phenomenon is responsible.
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He is also quoted as saying that while it has been an exciting time for physicists trying to explain these events, "it looks like we'll have to wait for the next generation of experiments, which will increase exposure and sensitivity, to get a clear understanding of this anomaly."

Cue the HiCal 2 radio frequency pulser, which will help the scientists characterize the properties of the

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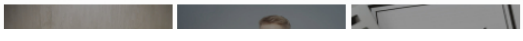

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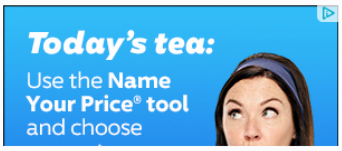

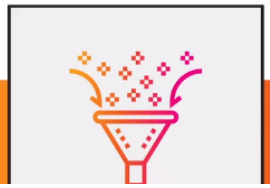

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